Table 1

(1) Comparison of the Present Invention and the Cited Reference

		Present Invention	NSC/Tamehiro	
Publication No.		2004SN00625	WO96/23909	
Filing Date or Publication Dat		Application filed 2003.1.14	1996.8.8	
What is claimed is				
Component(mass%)	C	0.03–0.1	0.05–0.10	
	Si	0.01–0.5	≦0.6	
	Mn	1.2–2.5	1.7–2.5	
	P		≦0.015	
	S		≦0.003	
	Al	≦0.08	≦0.06	
	Nb	0.005–0.07	0.01–0.10	
	V	0.005–0.1	*0.01–0.10*	
	Ti	0.005–0.04	0.005–0.030	
	Cu	*≦0.5*	*0.1–1.2*	
	Ni	*≦0.5*	0.1–0.6	
	Cr	*≦0.5*	*0.1–1*	
	Mo	0.05–0.4	0.15–0.60	
	B	*≦0.005*	*0.0003–0.0020*	
	Ca	*0.0005–0.003*	*0.001–0.006*	
	N		0.001–0.006	
	REM		0.001–0.02	
	Mg		0.001–0.006	
	C/(Mo+Ti+Nb+V)	1.2–3		
	P value			
Metal structure		Ferrit-bainite-MA MA fraction: 3–20% Complex carbon nitride of grain size of less than 10nm is precipitated in ferrite	Martensite-ferrite-bainite Ferrite fraction: 20–90% Ratio of worked ferrite in ferrite: 50–100%	⇒different
Process of making	Heating temperature	*1000–1300*	*950–1300*	
	Rolling finish temperature	*≧Ar3*	*650–800*	⇒different
	Rolling reduction rate		*50% or more at 950℃ or more* *10–70% in two-phase region of Ar3–Ar1 points*	⇒different
	Cooling rate	*≧5℃/s*	*Air cooling or accelerated cooling at 10℃/s*	
	Cooling stop	*450–650*	*≦500℃*	
	Heating rate	*≧0.5℃/s*		⇒different
	Reheating temperature	*550–750*		⇒different
	Pipe forming			
Mechanical		Low yield ratio	Low yield ratio	